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TRANSPORTATION TECHNICAL REPORT 1988

For Amoco CO_2 Projects Environmental Impact Statement

Prepared For:

U.S. Department of the Interior

Bureau of Land Management

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AMOCO CO_2 PRODUCTS TRANSPORTATION TECHNICAL REPORT CHAPTER ONE: INTRODUCTION

1.1 PURPOSE

Amoco Production Company has proposed the development of five separate and distinct projects in the State of Wyoming. An Environmental Impact Statement (EIS) is being prepared to analyze the potential impacts associated with construction, operation, maintenance and abandonment of these five separate projects. This technical report was prepared to support the EIS analysis of potential impacts to transportation.

1.2 OVERVIEW OF THE PROJECTS

Amoco proposes to implement enhanced oil recovery through the injection of CO_2 in four established fields: Elk Basin, Beaver Creek, Little Buffalo Basin and Salt Creek (Figure 1-1). The CO_2 would be supplied by the Fontenelle Project, which would obtain CO_2 from the nearby Raptor Field and process it for transport. Pipelines (16 or 18 inch) would be constructed to deliver the CO_2 in conjunction with existing CO_2 pipelines, to the four fields. A plant to recycle injected CO_2 would be constructed in each of the four fields. Details of each project and schedules are included in Chapter 2 of the EIS.

The Fontenelle CO_2 Supply Project would be constructed in 1989 and 1990. Construction of the Elk Basin CO_2 Project would occur in 1989, 1990 and 1991. The Beaver Creek CO_2 Project is proposed for 1991, 1992 and 1993. The Little Buffalo Basin CO_2 Project is proposed for 1992, 1993 and 1994. The Salt Creek CO_2 Project's proposed construction is scheduled for 1993 to 1997.

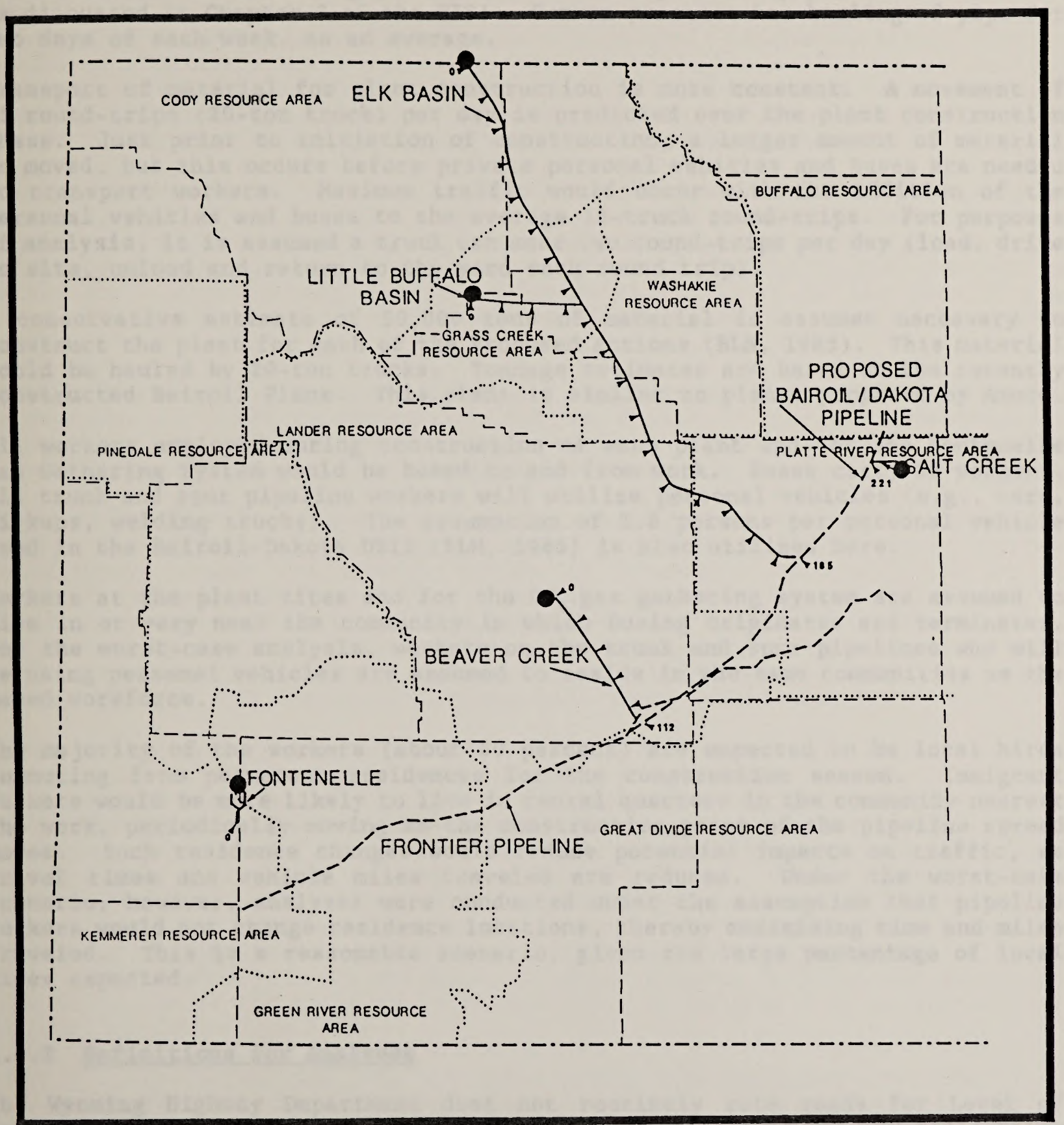
1.3 SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

The scope of the EIS is primarily restricted to analyzing the impacts associated with construction of CO_2 spur and trunk pipelines and the proposed gas processing and CO_2 recycle plants. While impacts of wellfield activities are discussed, precise plans and locations for wellfield-related activities are not available at this time. Analysis and mitigation of specific impacts associated with individual wellfield-related activities will be conducted after preparation of field development plans.

1.4 ANALYSIS COMPONENTS

1.4.1 Assumptions for Analyses

As discussed in Chapter 1 of the EIS, these analyses must assume a worst-case situation when either exact numbers or timing is not available. As such, the number of days of construction is minimized, and the number of loads per day is maximized consistently throughout these analyses.



BLM RESOURCE AREA BOUNDARY
PROPOSED PIPELINE ALIGNMENT
EXISTING FRONTIER PIPELINE
PROPOSED BAIROIL/DAKOTA PIPELINE
COUNTY LINE
OIL OR CO_2 FIELDS
MILEPOST (10 MILES)

Figure 1—1. Location of Proposed Pipeline Alignments.

For transport of material, a load of 20 tons per truck is assumed (BLM, 1985). One mile of pipe weighs approximately 132 tons (approximately 50 pounds per linear foot). Movement of pipe is not a constant process (pipeline construction is discussed in Chapter 2 of the EIS). Common practice has hauling of pipe for two days of each week, as an average.

Transport of material for plant construction is more constant. A movement of 15 round-trips (20-ton truck) per day is predicted over the plant construction phase. Just prior to initiation of construction, a larger amount of material is moved, but this occurs before private personal vehicles and buses are needed to transport workers. Maximum traffic would occur with the addition of the personal vehicles and buses to the average 15-truck round-trips. For purposes of analysis, it is assumed a truck can make two round-trips per day (load, drive to site, unload and return to the yard each round-trip).

A conservative estimate of 50,000 tons of material is assumed necessary to construct the plant for each of the Proposed Actions (BLM, 1985). This material would be hauled by 20-ton trucks. Tonnage estimates are based on the recently constructed Bairoil Plant. This plant is similar to plants proposed by Amoco.

All workers employed during construction of each plant and for the Fontenelle Gas Gathering System would be bused to and from work. Buses carry 52 workers. All trunk and spur pipeline workers will utilize personal vehicles (e.g., cars, pickups, welding trucks). The assumption of 1.8 persons per personal vehicle used in the Bairoil-Dakota DEIS (BLM, 1985) is also utilized here.

Workers at the plant sites and for the CO_2 gas gathering system are assumed to live in or very near the community in which busing originates and terminates. For the worst-case analysis, workers on the trunk and spur pipelines who will be using personal vehicles are assumed to reside in the same communities as the based workforce.

The majority of the workers (about 60 percent) are expected to be local hires commuting from permanent residences for the construction season. Inmigrant workers would be more likely to live in rental quarters in the community nearest the work, periodically moving as the construction point of the pipeline spread moves. Such residence changes would reduce potential impacts on traffic, as travel times and vehicle miles traveled are reduced. Under the worst-case scenario, however, analyses were conducted under the assumption that pipeline workers would not change residence locations, thereby maximizing time and miles traveled. This is a reasonable scenario, given the large percentage of local hires expected.

1.4.2 Definitions for Analyses

The Wyoming Highway Department does not routinely rate roads for Level of Service (LOS). They identify road segments as deficient if the LOS falls below C or D. Design levels of service are A, B or C, as defined by the Transportation Research Board's Highway Capacity Manual (1985). No road segments within the project area are identified by the Wyoming Highway Department as deficient (Warburton, 1988). Levels of service defined by the Transportation Research Board are:

Level of Service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The

general level of comfort and convenience provided to the motorist, passenger or pedestrian is excellent.

Level of Service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A because the presence of others in the traffic stream begins to affect individual behavior.

Level of Service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level of Service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level of Service E represents operating conditions at or near the capacity level. All speeds are reduced to a low but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level of Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and Level of Service F is an appropriate designation for such points.

Average Daily Traffic (ADT) is the total volume passing a point or segment of a highway facility in both directions in a day. The factor is usually determined as an average over the year (Transportation Research Board, 1985). It is difficult to realistically define capacities on rural two-lane highways. As a <u>general</u> reference point, at a Level of Service of C (as defined above) on level terrain, 1,200 passenger cars per hour would operate at an average speed exceeding 52 miles per hour (Transportation Research Board, 1985). This roughly translates to 28,000 ADT. Again, this is only a general reference point, as it does not consider trucks, buses or recreational vehicles, only passenger cars. It also assumes ideal conditions.

1.4.3 Load Limits

Extensive industrial development for resource extraction has used the Wyoming road network for haulage of large loads of material and equipment needed for development. Exceptions to load limits, in terms of height, width and weight, must be permitted through the Wyoming Highway Department. The department has developed an "Inventory of Structures" which provides information on vertical clearance limits (Wyoming Highway Department, 1986) within the state. Based on telephone conversations with department staff, no specific listings of bridge weight limits or horizontal clearance limitations has been developed (Howe, 1988a). The department indicated, however, that loads of up to 26 feet wide were routine with proper permits and coordination. Bridge weight limitation listings are not compiled by the department. Any particular structure's limits can be determined by contacting the department's Bridge Department (Howe, 1988b).

AMOCO CO_2 PROJECTS
TRANSPORTATION
TECHNICAL REPORT
CHAPTER TWO:
AFFECTED ENVIRONMENT

2.1 INTRODUCTION

Wyoming, as the country's least populated state, is typically rural and served by rural road systems. Three interstate highways are located in Wyoming: I-80 crossing the southern portion of the state from west to east; I-25 crossing from the southeast corner of the state to the north central border; and I-90 cutting through the northeastern portion of the state. Limited portions of the project area are served by I-25 or I-80. The majority is served by a network of paved U.S. and state highways, typically undivided two-lane highways. The U.S. and state systems are supplemented by secondary paved, gravel and dirt roads which are generally maintained by counties and various federal agencies (e.g., Bureau of Land Management and Bureau of Reclamation).

In addition to the public roads, an extensive system of roads or trails developed for existing energy developments is present in the vicinity of the proposed projects. These roads supplement the local and federal systems.

The southern portion of Wyoming is crossed by main lines of the Union Pacific Railroad. The Burlington Northern Railroad serves the northern and north-central portions of the state. Sidings to receive construction material could be used at Powell, Worland, Thermopolis, Riverton, Casper, Green River and Rock Springs.

Because of its own extensive energy resources and that of neighboring states, Wyoming is crossed by a great number of utility corridors. The oil and gas, mining and ranching industries have developed utility corridors throughout Wyoming for over a century. Almost all of Amoco's proposed trunk and spur pipelines are in existing utility corridors already containing several pipelines. All of the proposed CO_2 recycle plants would be placed in developed fields, already served by needed utilities. Each Proposed Action follows the BLM policy of construction of linear facilities within designated corridors.

2.2 FONTENELLE CO_2 SUPPLY PROJECT

The major portion of the Raptor CO_2 Field is east of Fontenelle Reservoir, with the remaining field to the west. The western portion is in Lincoln County, the eastern in Sweetwater County. The proposed Fontenelle Gas Processing Plant is adjacent to Exxon's existing Shute Creek Gas Plant approximately six miles south of the Fontenelle Dam in Sweetwater County (Figure 2-1).

Access for both material and workers to the Fontenelle Gas Processing Plant site would be via I-80 to State Route (S.R.) 372 to the paved Shute Creek Plant Road, from Rock Springs and Green River (Figure 2-2). Construction workers for the plant and field gathering system would be bused to the work site from Green River.

Development of the Raptor CO_2 Field, because of the location of Fontenelle Reservoir, would require construction of a gas gathering system to service both

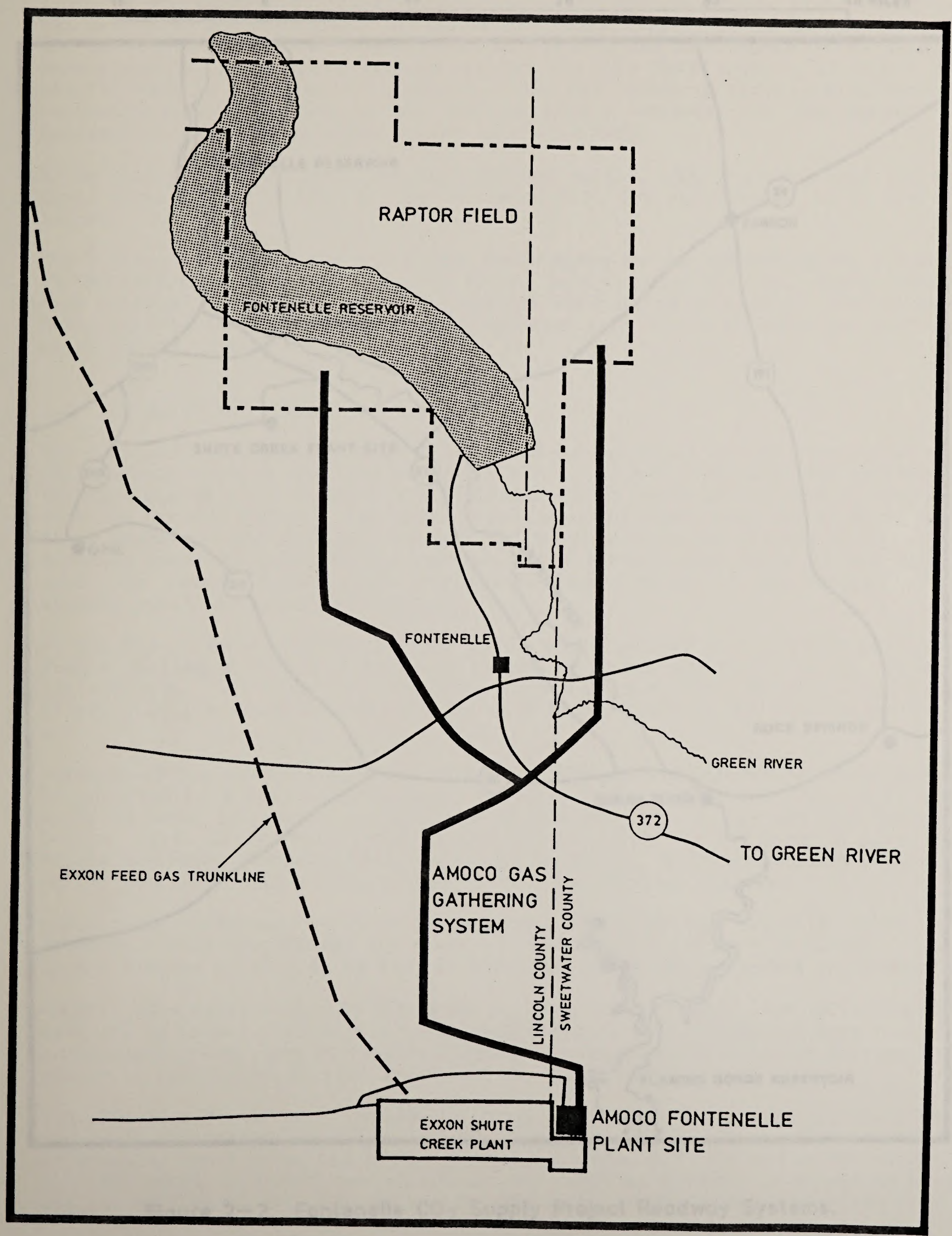


Figure 2—1. Proposed Fontenelle Project.

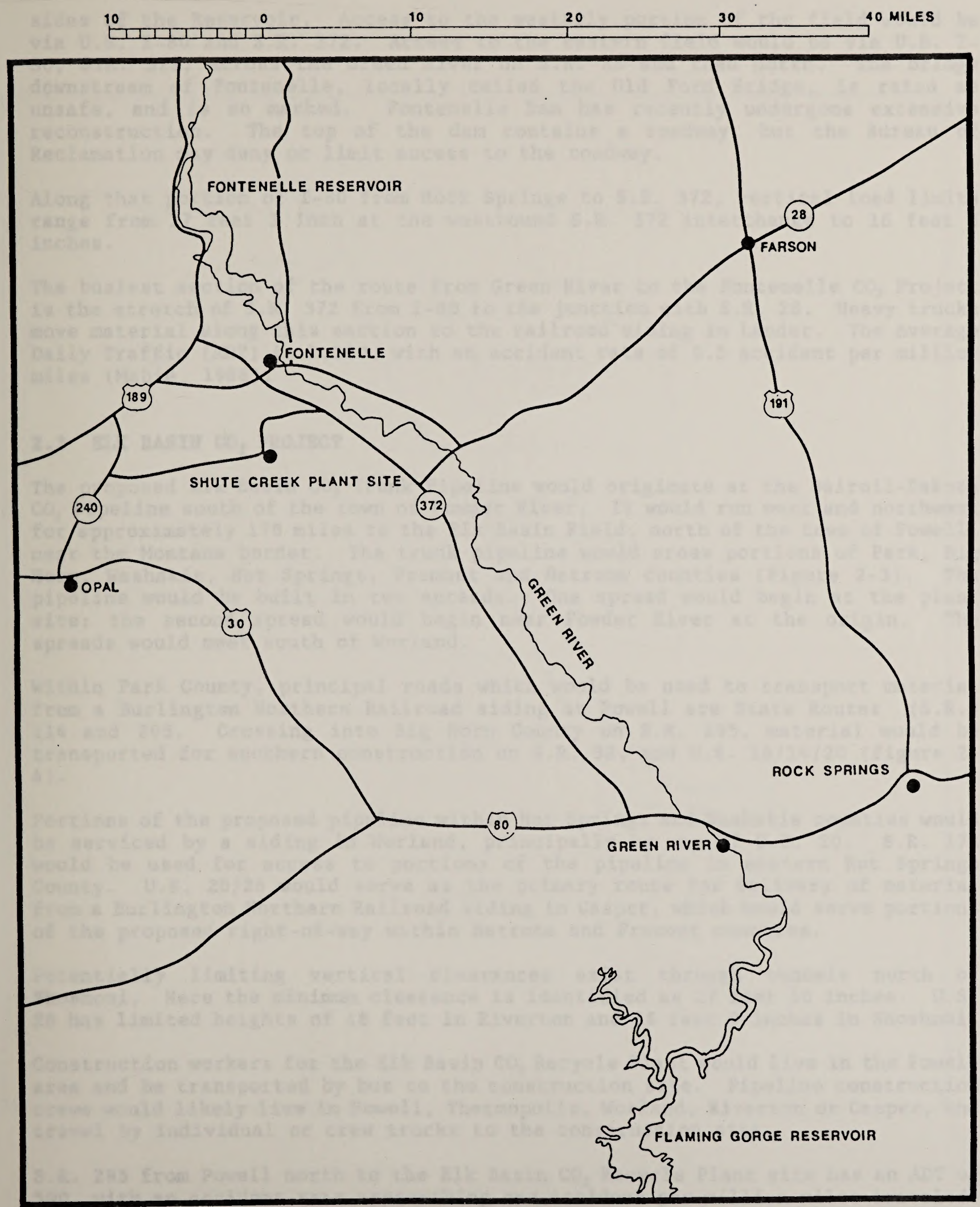


Figure 2—2. Fontenelle CO_2 Supply Project Roadway Systems.

sides of the Reservoir. Access to the westerly portion of the field would be via U.S. I-80 and S.R. 372. Access to the eastern field would be via U.S. I-80, S.R. 372, across the Green River on S.R. 28 and then north. The bridge downstream of Fontenelle, locally called the Old Ford Bridge, is rated as unsafe, and is so marked. Fontenelle Dam has recently undergone extensive reconstruction. The top of the dam contains a roadway, but the Bureau of Reclamation may deny or limit access to the roadway.

Along that portion of I-80 from Rock Springs to S.R. 372, vertical load limits range from 17 feet 1 inch at the westbound S.R. 372 interchange to 16 feet 6 inches.

The busiest section of the route from Green River to the Fontenelle CO_2 Project is the stretch of S.R. 372 from I-80 to the junction with S.R. 28. Heavy trucks move material along this section to the railroad siding in Lander. The Average Daily Traffic (ADT) is 1,100, with an accident rate of 0.5 accident per million miles (Mabie, 1988).

2.3 ELK BASIN CO_2 PROJECT

The proposed Elk Basin CO_2 Trunk Pipeline would originate at the Bairoil-Dakota CO_2 Pipeline south of the town of Powder River. It would run west and northwest for approximately 178 miles to the Elk Basin Field, north of the town of Powell, near the Montana border. The trunk pipeline would cross portions of Park, Big Horn, Washakie, Hot Springs, Fremont and Natrona counties (Figure 2-3). The pipeline would be built in two spreads. One spread would begin at the plant site; the second spread would begin near Powder River at the origin. The spreads would meet south of Worland.

Within Park County, principal roads which would be used to transport material from a Burlington Northern Railroad siding at Powell are State Routes (S.R.) 114 and 295. Crossing into Big Horn County on S.R. 295, material would be transported for southern construction on S.R. 32, and U.S. 16/14/20 (Figure 2-4).

Portions of the proposed pipeline within Hot Springs and Washakie counties would be serviced by a siding in Worland, principally by way of U.S. 20. S.R. 172 would be used for access to portions of the pipeline in eastern Hot Springs County. U.S. 20/26 would serve as the primary route for delivery of material from a Burlington Northern Railroad siding in Casper, which would serve portions of the proposed right-of-way within Natrona and Fremont counties.

Potentially limiting vertical clearances exist through tunnels north of Shoshoni. Here the minimum clearance is identified as 17 feet 10 inches. U.S. 26 has limited heights of 18 feet in Riverton and 16 feet 9 inches in Shoshoni.

Construction workers for the Elk Basin CO_2 Recycle Plant would live in the Powell area and be transported by bus to the construction site. Pipeline construction crews would likely live in Powell, Thermopolis, Worland, Riverton or Casper, and travel by individual or crew trucks to the construction site.

S.R. 295 from Powell north to the Elk Basin CO_2 Recycle Plant site has an ADT of 590, with an accident rate approaching one accident per million miles traveled. Progressing south along the proposed pipeline route, S.R. 114 has an ADT of 880. S.R. 295 south of Powell has an ADT of 900, with an accident rate approaching one per million miles. S.R. 32 has an ADT of 480, with a similar accident rate.

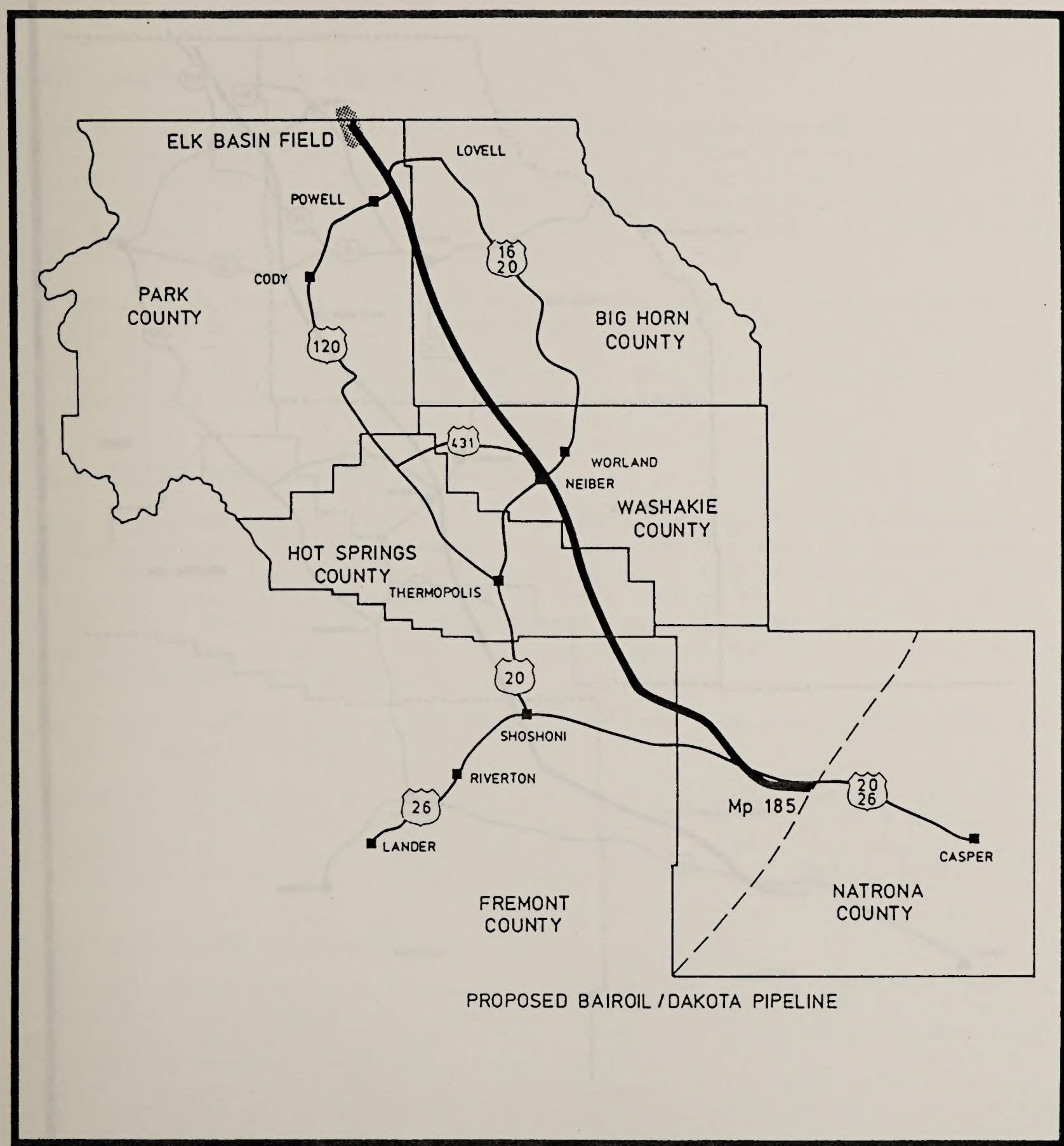


Figure 2—3. Proposed Elk Basin Project.

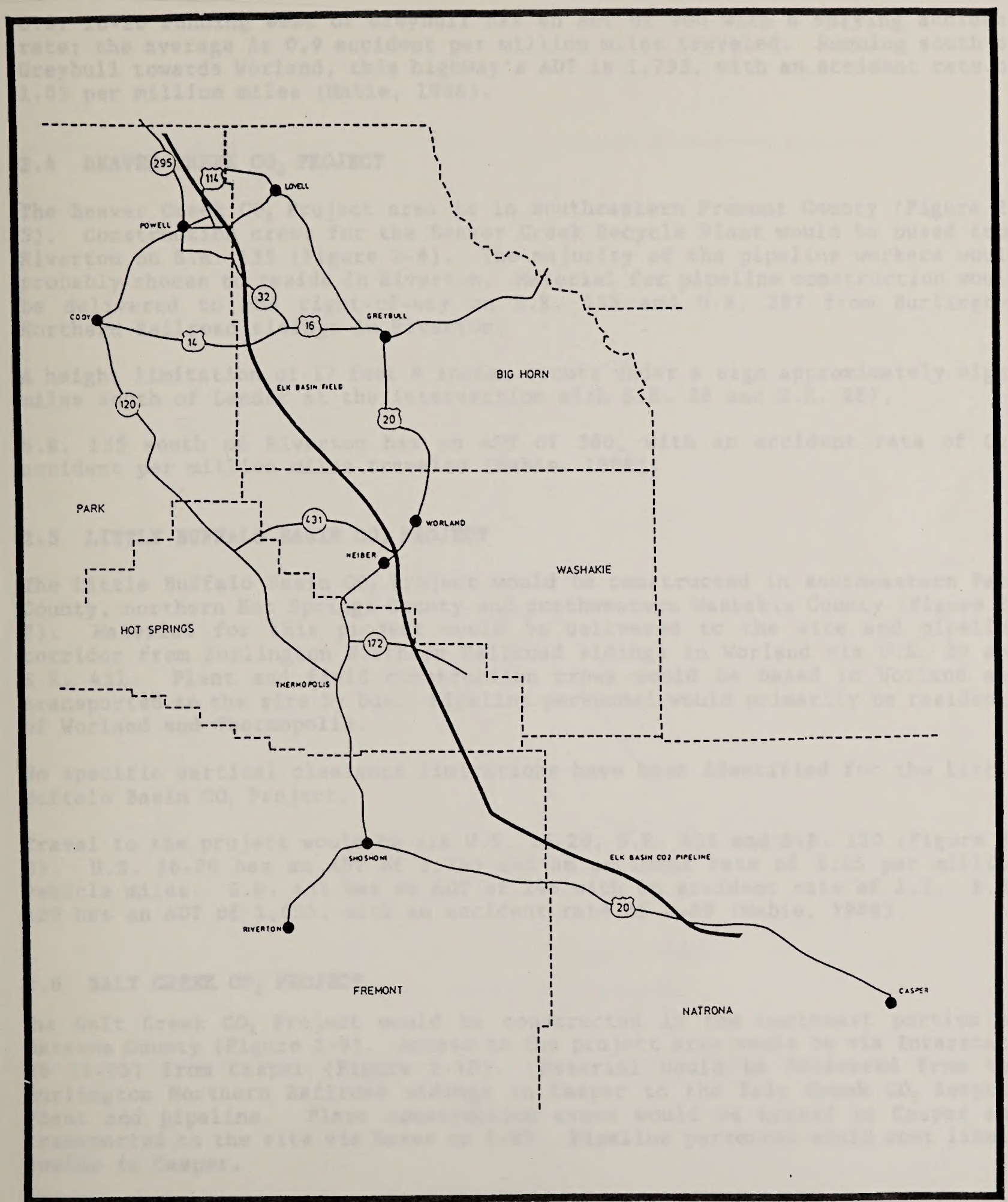


Figure 2—4. Elk Basin CO_2 Supply Project Roadway System.

U.S. 16-20 running west of Greybull has an ADT of 960 with a varying accident rate; the average is 0.9 accident per million miles traveled. Running south of Greybull towards Worland, this highway's ADT is 1,793, with an accident rate of 1.05 per million miles (Mabie, 1988).

2.4 BEAVER CREEK CO_2 PROJECT

The Beaver Creek CO_2 Project area is in southeastern Fremont County (Figure 2-5). Construction crews for the Beaver Creek Recycle Plant would be bused from Riverton on S.R. 135 (Figure 2-6). The majority of the pipeline workers would probably choose to reside in Riverton. Material for pipeline construction would be delivered to the right-of-way on S.R. 135 and U.S. 287 from Burlington Northern Railroad sidings in Riverton.

A height limitation of 17 feet 8 inches occurs under a sign approximately eight miles south of Lander at the intersection with S.R. 28 and S.R. 287.

S.R. 135 south of Riverton has an ADT of 380, with an accident rate of 0.7 accident per million miles traveled (Mabie, 1988).

2.5 LITTLE BUFFALO BASIN CO_2 PROJECT

The Little Buffalo Basin CO_2 Project would be constructed in southeastern Park County, northern Hot Springs County and northwestern Washakie County (Figure 2-7). Material for this project would be delivered to the site and pipeline corridor from Burlington Northern Railroad sidings in Worland via U.S. 20 and S.R. 431. Plant and field construction crews would be based in Worland and transported to the site by bus. Pipeline personnel would primarily be residents of Worland and Thermopolis.

No specific vertical clearance limitations have been identified for the Little Buffalo Basin CO_2 Project.

Travel to the project would be via U.S. 16-20, S.R. 431 and S.R. 120 (Figure 2-8). U.S. 16-20 has an ADT of 1,793 and an accident rate of 1.05 per million vehicle miles. S.R. 431 has an ADT of 295 with an accident rate of 1.2. S.R. 120 has an ADT of 1,053, with an accident rate of 0.89 (Mabie, 1988).

2.6 SALT CREEK CO_2 PROJECT

The Salt Creek CO_2 Project would be constructed in the northeast portion of Natrona County (Figure 2-9). Access to the project area would be via Interstate 25 (I-25) from Casper (Figure 2-10). Material would be delivered from the Burlington Northern Railroad sidings in Casper to the Salt Creek CO_2 Recycle Plant and pipeline. Plant construction crews would be housed in Casper and transported to the site via buses on I-25. Pipeline personnel would most likely reside in Casper.

Potential vertical clearance for limitations for oversize loads exist along I-25 in Casper. The lowest clearance, which could be bypassed, is 15 feet at the Bryan Stock Trail interchange. A limitation of 18 feet 2 inches occurs at the McKinley Street exit sign.

Interstate 25 has an ADT of 2,746, with an accident rate of 0.76 accident per million miles traveled.

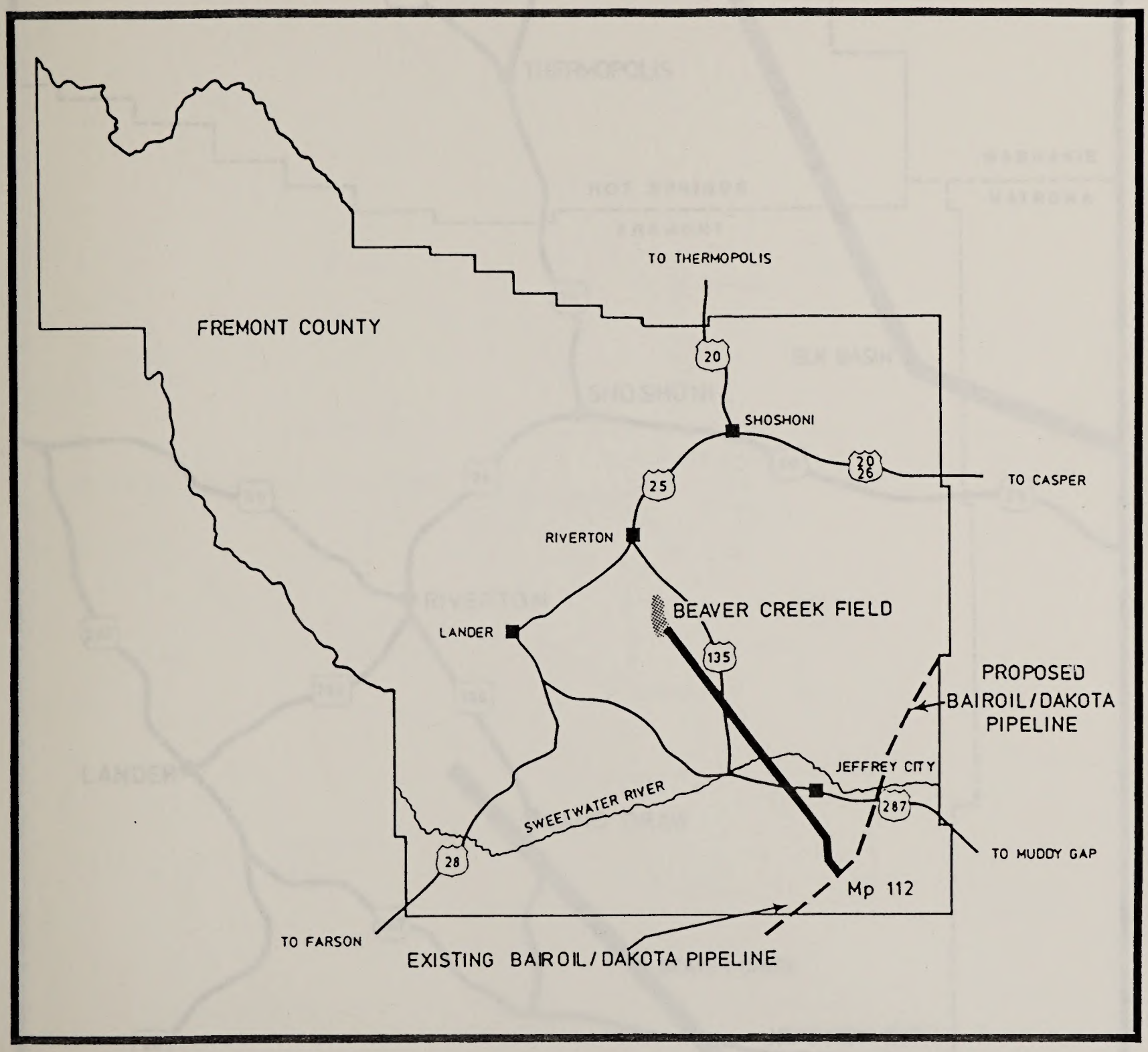


Figure 2—5. Proposed Beaver Creek Project.

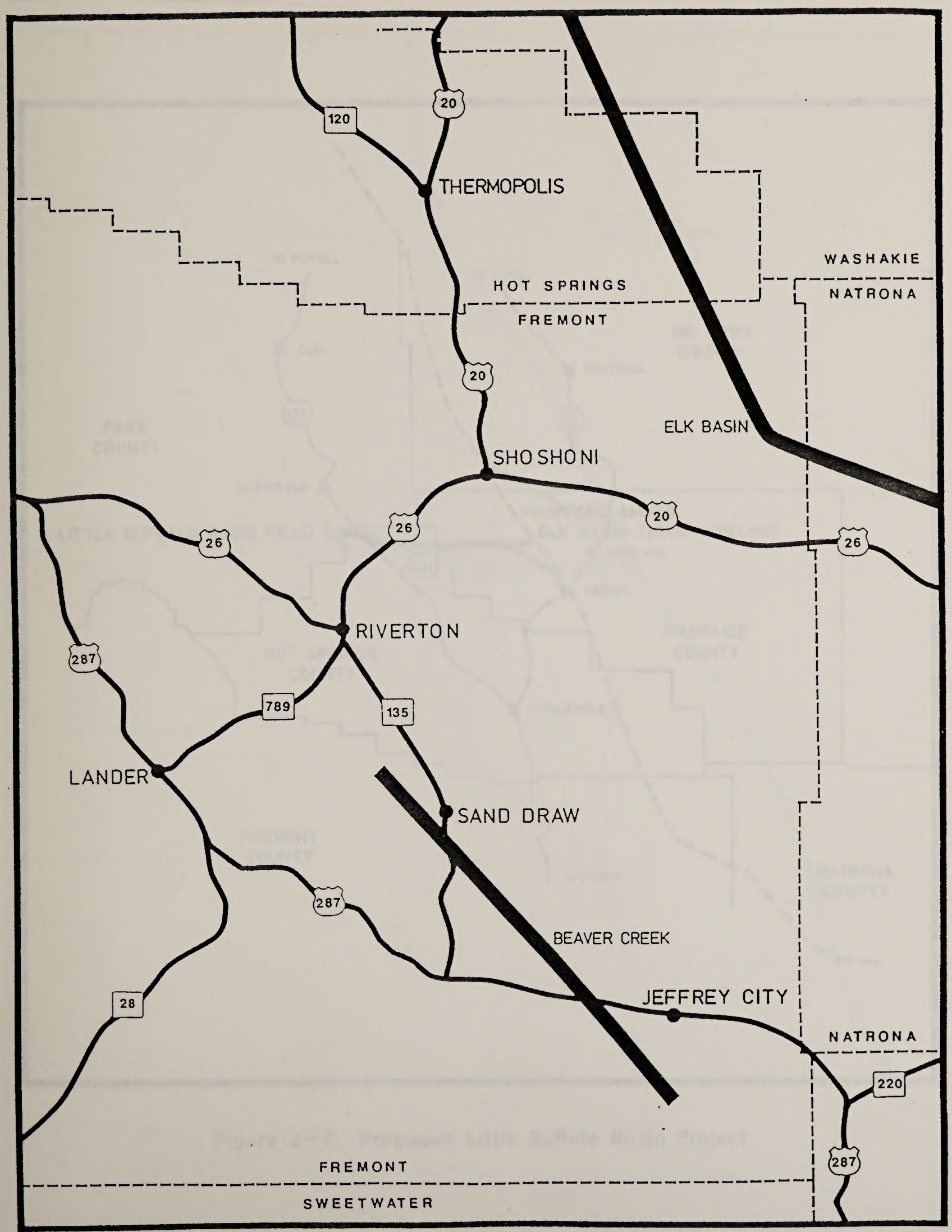


Figure 2—6. Beaver Creek CO_2 Supply Project Roadway System.

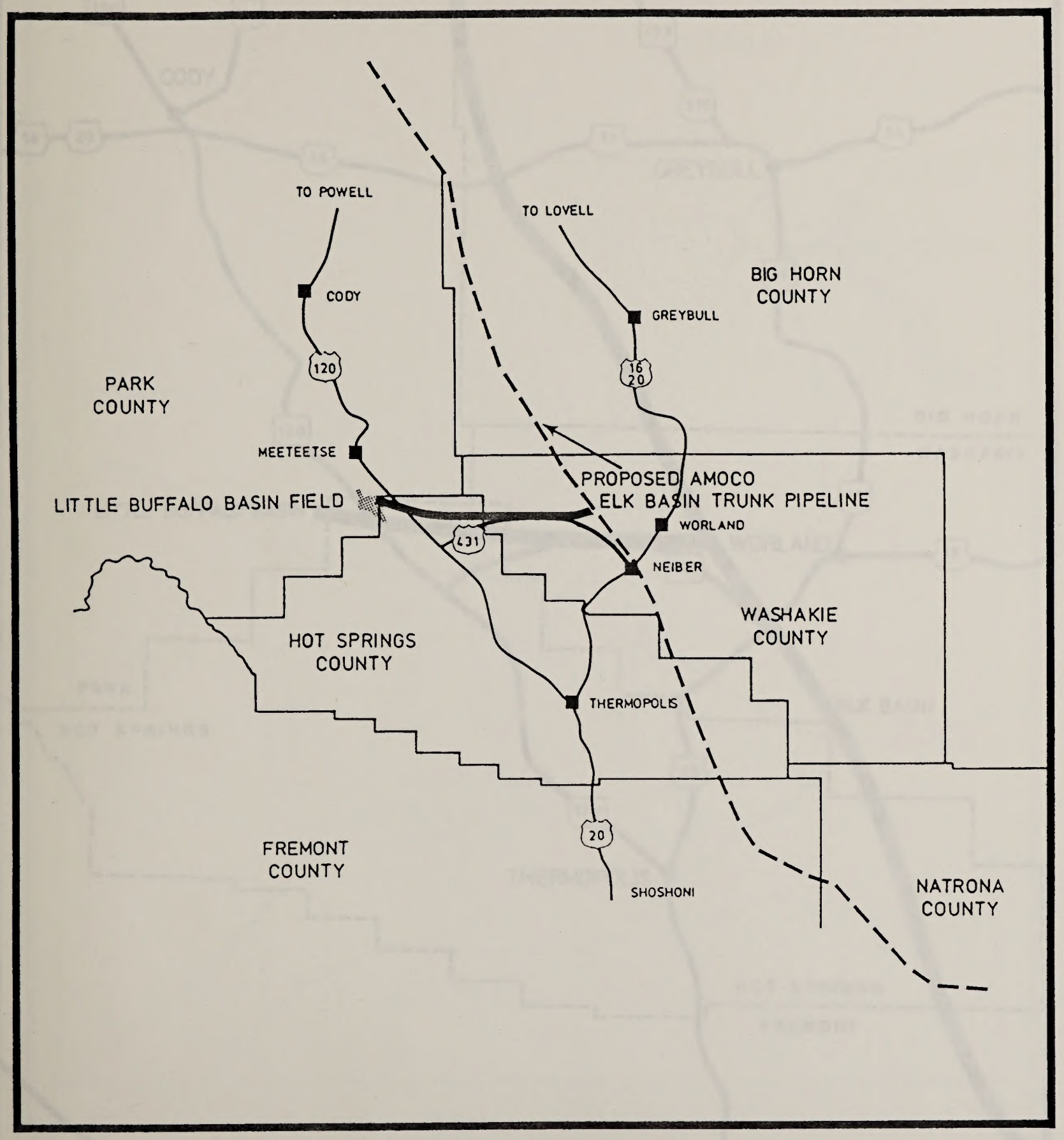


Figure 2—7. Proposed Little Buffalo Basin Project.

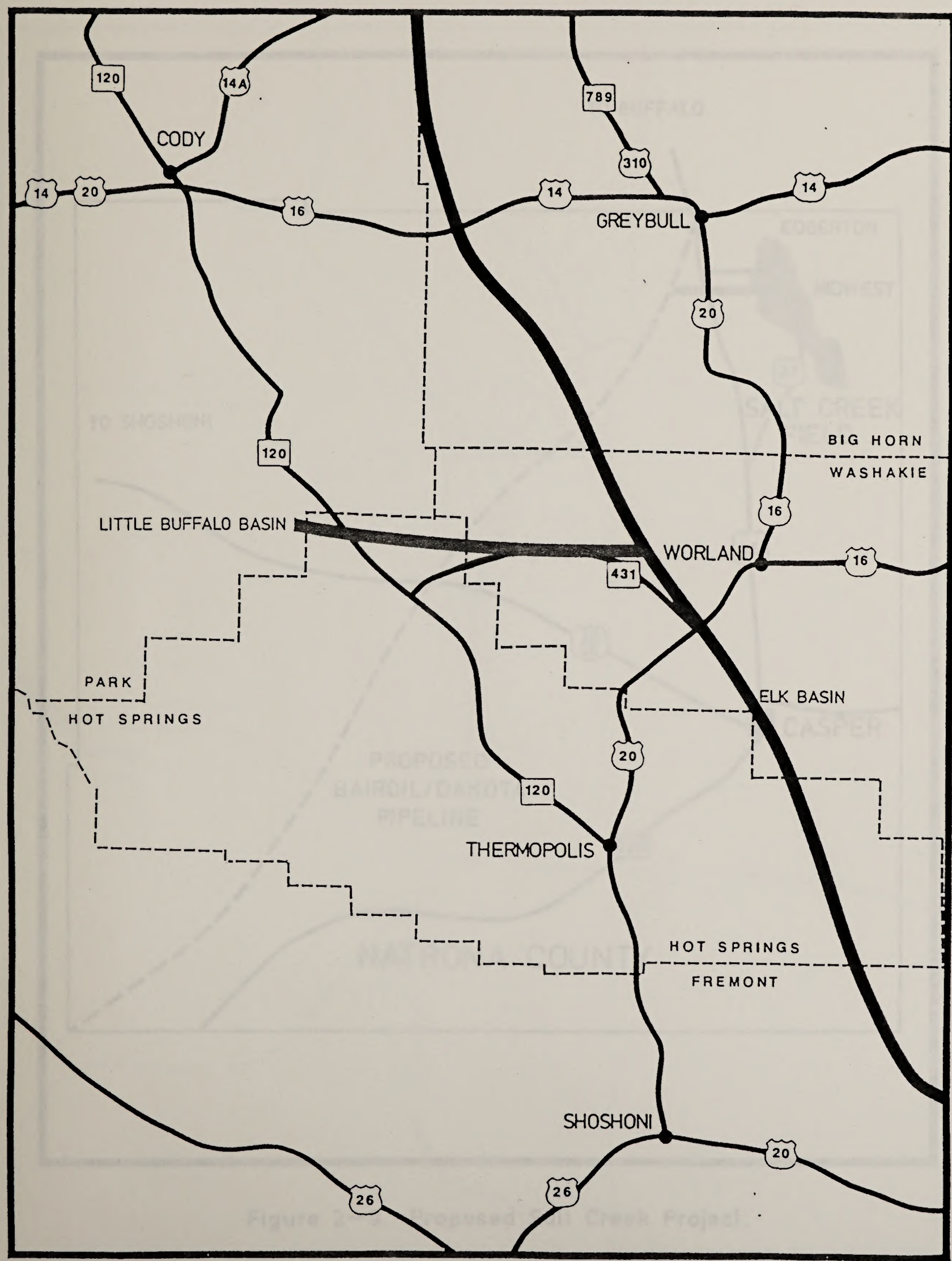


Figure 2—8. Little Buffalo Basin CO_2 Project Roadway System.

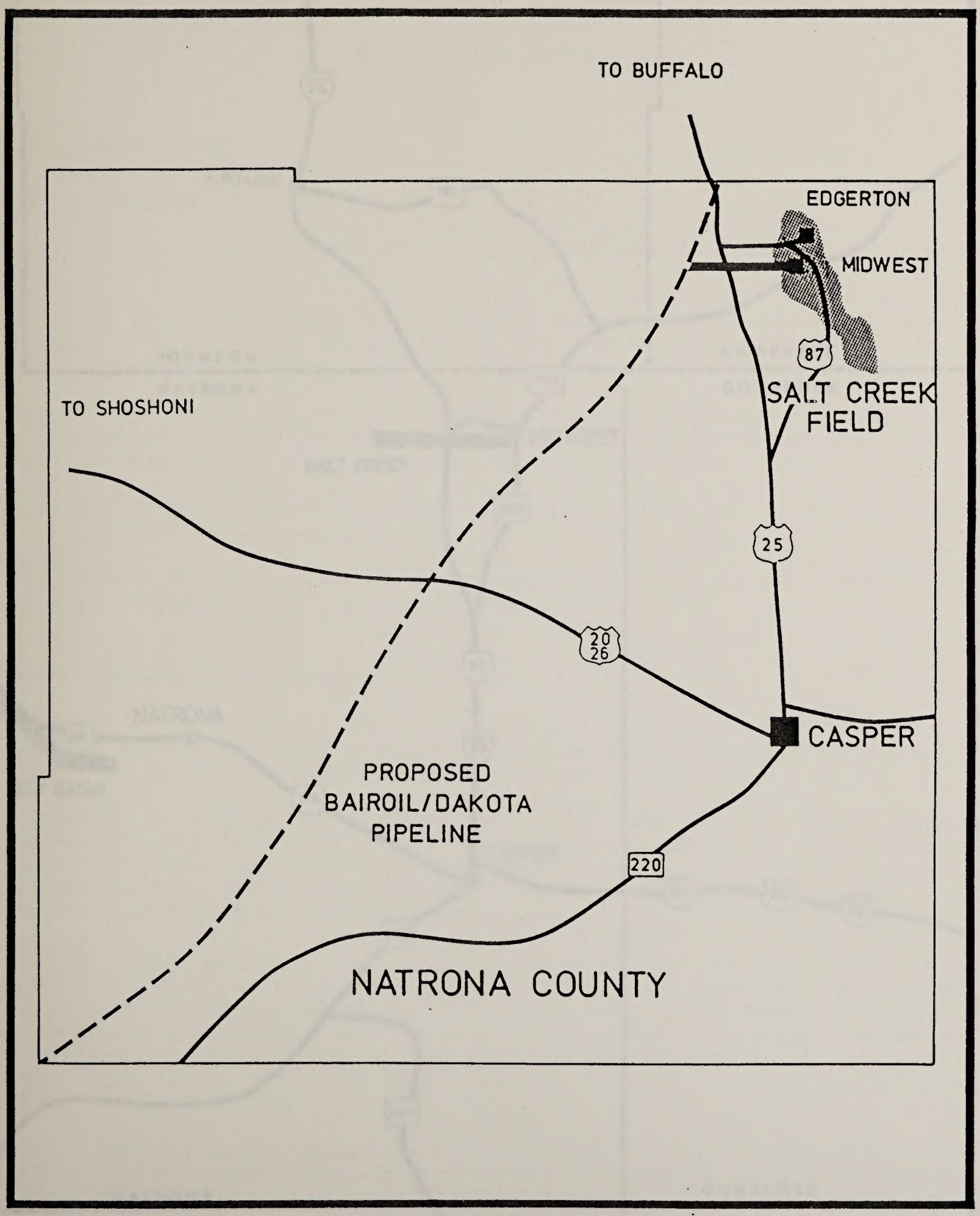


Figure 2—9. Proposed Salt Creek Project.

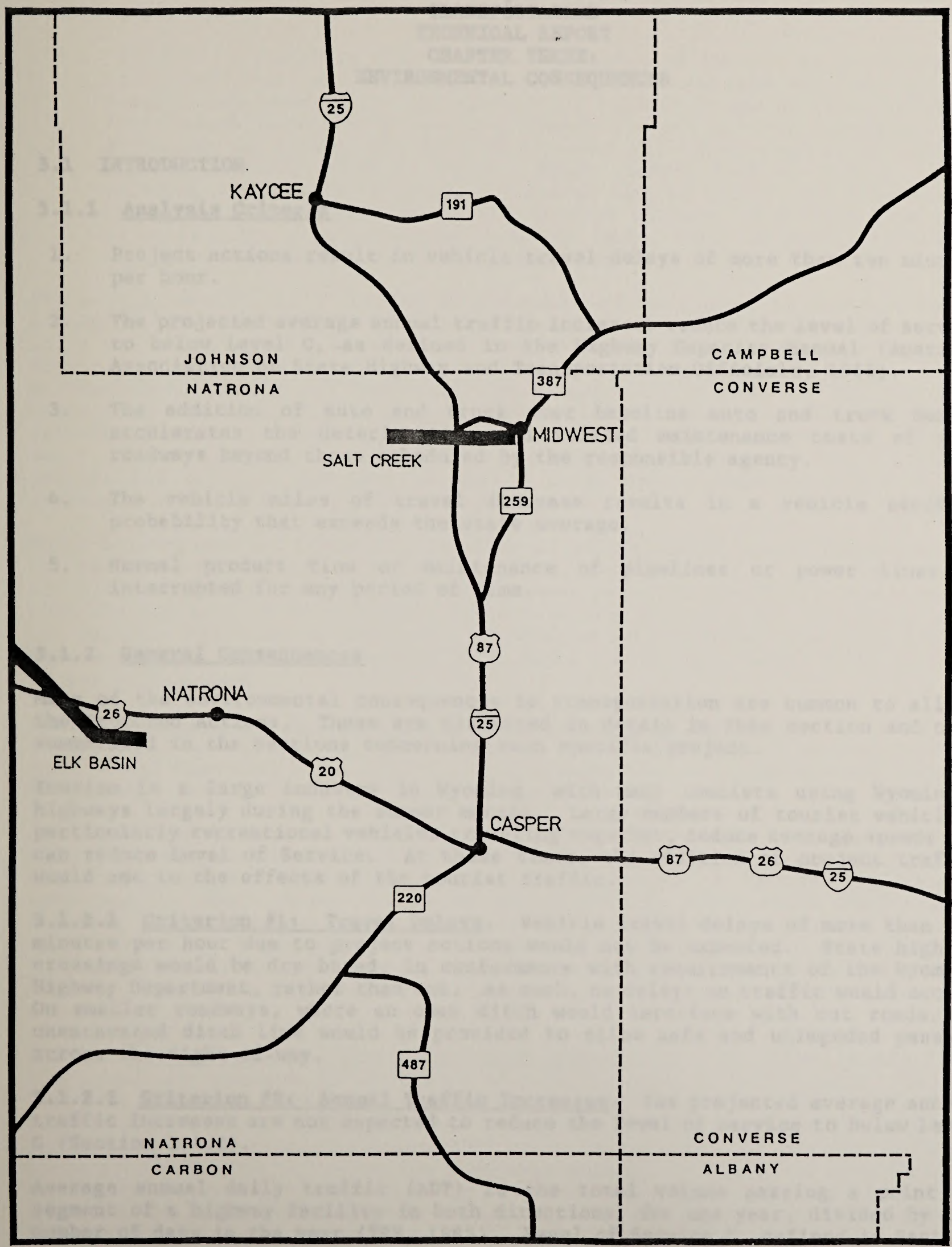


Figure 2—10. Salt Creek CO_2 Project Roadway System.

AMOCO CO_2 PROJECTS
TRANSPORTATION
TECHNICAL REPORT
CHAPTER THREE:
ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

3.1.1 Analysis Criteria

1. Project actions result in vehicle travel delays of more than ten minutes per hour.

2. The projected average annual traffic increases reduce the level of service to below Level C, as defined in the Highway Capacity Manual (American Association of State Highway and Transportation Officials, 1965).

3. The addition of auto and truck over baseline auto and truck demand accelerates the deterioration and related maintenance costs of area roadways beyond those scheduled by the responsible agency.

4. The vehicle miles of travel increase results in a vehicle accident probability that exceeds the state average.

5. Normal product flow or maintenance of pipelines or power lines is interrupted for any period of time.

3.1.2 General Consequences

Many of the environmental consequences to transportation are common to all of the Proposed Actions. These are discussed in detail in this section and only summarized in the sections concerning each specific project.

Tourism is a large industry in Wyoming, with many tourists using Wyoming's highways largely during the summer months. Large numbers of tourist vehicles, particularly recreational vehicles traveling together, reduce average speeds and can reduce Level of Service. At these times, the addition of project traffic would add to the effects of the tourist traffic.

3.1.2.1 Criterion #1: Travel Delays. Vehicle travel delays of more than ten minutes per hour due to project actions would not be expected. State highway crossings would be dry bored, in conformance with requirements of the Wyoming Highway Department, rather than cut. As such, no delays to traffic would occur. On smaller roadways, where an open ditch would interface with cut roads, an unexcavated ditch line would be provided to allow safe and unimpeded passage across the right-of-way.

3.1.2.2 Criterion #2: Annual Traffic Increases. The projected average annual traffic increases are not expected to reduce the level of service to below Level C (Section 1.4.2).

Average annual daily traffic (ADT) is the total volume passing a point or segment of a highway facility in both directions, for one year, divided by the number of days in the year (TRB, 1985). Level of Service C, defined in Section

1.4.2, is characterized for two-lane rural highways in the Highway Capacity Manual (TRB, 1985):

> "Further increases in flow characterize Level of Service C, resulting in noticeable increases in platoon formation, platoon size and frequency of passing impediment. Average speed still exceeds 52 mph on level terrain, even though unrestricted passing demand exceeds passing capacity. At higher volume levels, chaining of platoons and significant reductions in passing capacity begin to occur. While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles. Percent time delays are up to 60 percent. A service flow rate of up to 1,200 pcph (passenger cars per hour), total in both directions, can be accommodated under ideal conditions."

The average annual daily traffic is a measure of the number of vehicles using a roadway. The source flow rate is a projection of the number of vehicles that could use a roadway at a given level of service. As noted above, at a Level of Service C, under ideal conditions, up to 1,200 passenger cars per hour can be accommodated. Table 3-1 indicates the largest ADT reading of any two-lane highway to be used is 1,793, on U.S. Highway 16/20. This ADT would project 75 vehicles per hour to pass a given point, for each of the 24 hours in an average day. If all traffic occurred during the daylight (12 hours), the ADT would project 150 vehicles per hour to pass a given point, compared to the 1,200 passenger cars per hour of Level of Service C.

These comparisons are valid only to allow an estimation of scale; conditions do not remain ideal, terrain is not flat and consideration must be made that trucks and buses are not passenger cars. Given these potential modifiers, the numbers show the highways to be utilized (Table 3-1) are presently not operating near the capacity for Level of Service C. No Proposed Action (each discussed below) adds sufficient traffic to meaningfully raise the average annual daily traffic on any road segment.

3.1.2.3 <u>Criterion # 3: Accelerated Deterioration of Roadways</u>. The addition of traffic, especially the heavy vehicles (trucks and buses), making regular runs to and from each plant site would accelerate the deterioration and related maintenance costs of at least some road segments.

As noted below in Section 3.1.3, Potential Impact Avoidance, some upgrading of existing roads may be necessary, and any damage done to roads which could result from construction of the pipelines would be repaired to original condition. Additionally, during construction of the pipelines, Amoco would comply with existing federal, state, county and private requirements developed to protect road networks. Load limit restrictions would be observed at all times to prevent damage to the road surface. Special arrangements would be made with the Wyoming Highway Department and county governments to transport oversize and heavy loads.

3.1.2.4 <u>Criterion #4: Vehicle Accident Probability</u>. Accident probability rises with any increase in the number of vehicles using a road segment. Use of buses to transport workers to the plant site will minimize increases in the number of vehicles. The greatest potential for an increase in accident probability would generally occur very early in a project if pipeline workers in personal vehicles are using the same road segments as the plant construction trucks and buses. The large majority of local hires will tend to minimize any increase, as local workers are more familiar with the road systems, conditions and weather.

Table 3-1. Highway Segment Use.

Route	Project	Average Annual Daily Traffic	Vehicle Accident Probability (per million vehicle miles traveled)
SR 372	Fontenelle CO2 Supply Project	1,100	0.5
SR 295 North of Powell	Elk Basin CO2 Project	590	0.98
SR 295 South of Powell	Elk Basin CO2 Project	900	0.98
SR 114	Elk Basin CO2 Project	880	1.02
SR 32	Elk Basin CO2 Project	480	1.0
US 16-20 West of Greybull	Elk Basin CO2 Project	960	0.9
US 16-20 Greybull to Worland	Elk Basin CO2 Project and Little Buffalo Basin CO2 Project	1,793	1.05
SR 135	Beaver Creek CO2 Project	380	0.7
US 287	Beaver Creek CO2 Project	1,674	0.93
SR 431	Little Buffalo Basin CO2 Project	295	1.2
SR 120	Little Buffalo Basin CO2 Project	1,053	0.89
I-25	Salt Creek CO2 Project	2,746	0.76

Table 6-1. Highway Proposed Uses.

Accident occurrences are reported as x accidents per million vehicle miles. Accident rates throughout the highway segments for all of the proposed projects are approximately one accident per million vehicle miles (Table 3-1). The very low number of actual accidents precludes meaningful projections. As an example, S.R. 295 near Powell experienced four accidents in the last year of currently available data. One additional accident would increase the number of accidents by 25 percent. The statewide average for vehicle accident probability for primary two-lane roads is 1.35 accidents per million vehicle miles (Mabie, 1988).

Vehicle Accident Probability is generally used as an indicator of a particular problem. An increase often can be ascribed to such things as foliage growing up in front of a stop sign or other signaling.

Vehicle Accident Probabilities for roadway segments to be used, or for a near segment for which there are data, are given in Table 3-1. State Route 431, to be used for the Little Buffalo Basin CO_2 Project, is the only roadway with a Vehicle Accident Probability near the state average. The next highest probability, that of U.S. 16/20, is 22 percent under the state average, with other roadways being less.

3.1.2.5 Criterion #5: Interruption of Pipelines or Power Lines. No interference with pipelines or power lines would occur. In those instances where the proposed pipelines must cross the route of another pipeline, existing construction techniques would allow the crossing without an interruption of flow.

3.1.3 Potential Impact Avoidance

Several measures are available to avoid potential impacts. Some of these are already incorporated in the project description. Others cannot be exactly established until time of construction approaches, as they must be fitted to the transportation baseline occurring at that time.

- Use of buses. The single most effective measure to reduce potential transportation impacts is the movement of construction workers by buses. As an example, a 500-person workforce can be serviced by 10 buses or an average of 278 cars or pickups. With a 60-mile round-trip from town to construction site (a rough average of the five Proposed Actions), the buses represent 600 vehicle miles of travel, while the private vehicles represent over 16,600 vehicle miles of travel. Use of buses reduces the number of vehicles on the roads and the number of vehicle miles traveled by greater than 95 percent. These reductions hugely diminish the potential for vehicle travel delays, reduction of Level of Service and vehicle accident probability.

  Additionally, the transportation is done by professional, licensed drivers, in vehicles with an ongoing safety/maintenance program.

- Use of Railroad Transport. Material would be moved from point of origin to relatively near each project by rail. This reduces the addition of large, heavy vehicles to the roadways, and greatly reduces the vehicle miles traveled attributable to the project.

- Location and Orientation of Staging Area. Placement of the area for bus loading and unloading is important to the local traffic system. Ease and

safety of ingress and egress of private vehicles and parking availability are key factors. The most meaningful potential effect on traffic flow and safety is the exit of private vehicles after bus unloading. A large number of vehicles is flushed onto the local system in a short period of time, and many of the vehicles are driven by workers in a hurry. Selection of staging area must be done near the time of construction to allow local traffic consideration to be incorporated. An efficient staging area can greatly reduce the potential for congestion and traffic accidents.

- All spur and trunk pipelines proposed by Amoco would parallel or bisect numerous existing roads. Therefore, no new road construction is anticipated during construction or operation of the pipelines. Some upgrading of existing roads, however, may be necessary. Any damage to roads which may result from construction of the pipeline would be repaired to original condition by Amoco.

- Amoco, at the direction of the Authorized Officer, would construct physical barriers to control off-road vehicle use of the rights-of-way after construction is complete. Amoco would not lock or close gates or cattle guards on established roads on public lands unless the gates or cattle guards were originally locked or closed.

- The pipeline rights-of-way would be used for access only during construction and maintenance of the pipelines. Periodic use of the rights-of-way would be necessary during maintenance operations to inspect valves and cathodic protection systems. No other use would occur without prior approval by the Authorized Officer.

- Signs would be placed at temporary road closures in advance of construction. When an open ditch occurs across a road, an unexcavated ditch line for passage would be created.

- State highway crossings and railroad crossings would be dry bored in conformance with the requirements of the Wyoming Highway Department.

3.2 FONTENELLE CO_2 SUPPLY PROJECT

3.2.1 Criterion #1: Traffic Delays

Project actions would not be expected to result in vehicle travel delays of more than ten minutes per hour. As noted in Section 3.1.2.1 above, highways would not be cut by the pipeline trench, but would be dry bored. This would eliminate the bulk of traffic delays associated with construction.

3.2.2 Criterion #2: Annual Traffic Increases

Construction of the 23 miles of pipeline would require transportation of 3,036 tons of pipe and material. Two loads of pipeline materials per week would be used.

Construction of the Fontenelle Gas Processing Plant would require approximately 50,000 tons of material. The plant would be constructed over a period of 18 months. Projected 20-ton truck traffic would consist of 15 round-trips per day. This would require use of eight trucks. A maximum of eight trucks could utilize

a route at any one time; in fact, at most times of the day, some trucks will be driving to the site, some returning to the yard and some loading or unloading.

The number of plant and field facility workers would reach a maximum of 520 in the first quarter of 1990, requiring 10 buses (Table 3-2). An additional 30 cars or pickup truck trips per day is estimated for supervisory, engineering or supply trips.

The number of drill crew personnel would be 135. These workers would initiate 75 pickup/car round-trips, assuming 1.8 passengers per vehicle (BLM, 1985). This is the maximum, and would occur sometime during the third quarter of 1989 (Table 3-3).

The maximum potential loading on I-80--S.R. 372 would be during the first quarter of 1990. Peak 20-ton truck traffic would have occurred at the beginning of plant construction during 1989. During the first quarter of 1990, 128 pickup/car trips (23 for pipeline crews + 75 for drill crews + 30 miscellaneous plant trips), 10 bus trips, and 15 20-ton truck trips are the maximum likely to occur on any day.

The maximum impact to average annual traffic increases (Criterion #2) would occur in 1990, a full year of construction. Assuming the maximum buses needed for each quarter, an average of six bus round-trips would be needed throughout the year between Green River and the proposed plant site. Fifteen 20-ton truck round-trips and 30 miscellaneous car/pickup truck round-trips would be done, as described above. Drilling would be completed in the first quarter of 1990 (Table 3-3). A total of 75 car/pickup truck round-trips are assumed to occur throughout the first quarter.

An assumption of a work week of six days results in 313 work days in 1990, ignoring any specific holidays.

6	buses
15	20-ton trucks
30	miscellaneous car/pickup
51	round-trips per day, 313 days

Drilling would be completed by the end of the first quarter, resulting in 75 round-trips for 78 days. Spaced over 313 days for analysis purposes, this becomes 20 round-trips for 313 days, as the statistic is average annual daily traffic. The 51 round-trips plus 20 round-trips is 71 round-trips per day, for 313 days, or 22,223 trips in 1990 (71 x 313). Average annual daily traffic is defined as the total volume of traffic passing a point in both directions for one year, divided by the number of days in the year. The 22,223 trips in 1990 divided by 365 yields an added ADT of 61. S.R. 372 has an ADT of 1,100, as discussed in Section 3.1.2.2, operates within a Level of Service C. The addition of project traffic would not be expected to reduce the level of service to below a Level C.

These analyses assume all of the trips initiate in the Green River/Rock Springs area. It is likely some workers will already be residing in nearby Kemmerer, LaBarge or Opal. These workers would not use S.R. 372 and their proportional impact would be eliminated.

Table 3-2. Busload Projections for Construction of the Fontenelle Project.

Project/Component	1989 2Q	1989 3Q	1989 4Q	1990 1Q	1990 2Q	1990 3Q	1990 4Q
Gas Processing Plant							
Construction	2	6	8	9	6	3	1
Field Facilities							
Construction	1	2	1	1	2	2	0
Total Buses	3	8	9	10	8	5	1

Table 3-3. Workforce Projections for Construction and Operation of the Fontenelle Project.

Project/Component	1989 2Q	1989 3Q	1989 4Q	1990 1Q	1990 2Q	1990 3Q	1990 4Q
Gas Processing Plant							
Construction	110	330	400	480	310	160	50
Operations	0	0	0	0	0	8	8
Field Facilities							
Construction	30	80	40	40	80	80	0
Drill Crews (a)	135	135	135	135	0	0	0
Total Construction (b)	140	410	440	520	390	240	50
Total Operation	0	0	0	0	0	8	8
TOTAL WORKFORCE	275	545	575	655	390	248	58

a = Based on 10 wells; 5 rigs; 6 months spud to spud; 27 drillers/well.
b = Plant and field construction workforce.

3.2.3 Criterion #3: Accelerated Roadway Deterioration

The addition of this traffic could accelerate the deterioration and related maintenance costs of S.R. 372. The project traffic would account for approximately 5 percent of the traffic on S.R. 372.

3.2.4 Criterion #4: Vehicle Accident Probability

S.R. 372 has a reported ADT of 1,100 (Table 3-1). The vehicle accident probability is 0.5 accident per million vehicle miles. In 1990, the proposed project would generate an additional 1.7 million vehicle miles. Given the adequate level of service and present probability of 0.5 accident per million vehicle miles, the proposed project traffic is not expected to increase the vehicle accident probability as to exceed the state average of 1.35 accidents per million vehicle miles.

The vehicle accident probability would rise during the first stages of construction due to the sudden increase in the number of vehicles. The large outflow of private vehicles from the staging area after the buses unload can create a situation in which accidents are more likely with many vehicles trying to enter traffic in a short time. Location and orientation of the staging area can greatly reduce this risk.

3.2.5 Criterion #5: Interruption of Pipelines or Power Lines

Normal flow and maintenance of pipelines and power lines would not be affected. Construction techniques allow pipelines and pipeline rights-of-way to be crossed. The pipeline trench would not remain open long enough to interfere with maintenance of other lines.

3.3 ELK BASIN CO_2 PROJECT

3.3.1 Criterion #1: Traffic Delays

Project actions would not be expected to result in vehicle travel delays of more than ten minutes per hour. As noted in Section 3.1.2.1 above, highways would not be cut by the pipeline trench, but would be dry bored. This would eliminate the bulk of traffic delays associated with construction.

3.3.2 Criterion #2: Annual Traffic Increases

Construction of the 178 miles of 18-inch pipeline would require transportation of 11,880 tons of pipe and material for each of two construction spreads (Spread One from the Elk Basin CO_2 Recycle Plant site north of Powell to south of Worland, Spread Two from Powder River to south of Worland). The pipeline would be constructed over a period of 9 months (39 weeks). At a constant rate, 16 loads per week would be required by each spread. With delivery assumed at two days each week, each spread would require eight loads on each of the two days, or eight round-trips. This would require the use of four trucks. At a maximum, four trucks would utilize a route at one time. As discussed above, most of the time some trucks are going to the site, some are returning and some are loading or unloading.

The number of pipeline workers would reach a maximum of 320 in the third quarter of 1990. Assuming 1.8 passengers per vehicle (BLM, 1985), the maximum number of daily trips would be 22 from each community of origin (Casper, Thermopolis, Riverton and Worland) for Spread Two. For Spread One, the maximum number of daily trips would be 44 from each community of origin (Powell and Worland.)

Construction of the Elk Basin CO_2 Recycle Plant would require approximately 50,000 tons of material. The plant would be constructed over a period of 18 months. Projected 20-ton truck traffic would consist of 15 round-trips per day. This would require use of eight trucks. A maximum of eight trucks could utilize a route at any one time; in fact, at most times of the day some trucks will be driving to the site, some returning to the yard and some loading or unloading.

The number of plant and field facility workers would reach a maximum of 500 in the first quarter of 1991, requiring 10 buses (Table 3-4). An additional 30 cars or pickup truck trips per day is estimated for supervisory, engineering or supply trips.

The maximum loading for S.R. 295 from Powell to the Elk Basin Field would likely occur in the second quarter of 1990, with the initiation of a trunk pipeline construction. Although there are greater numbers of workers in the third quarter of 1990 (Table 3-5), by that time Spread One would have progressed to a point east or south of Powell, and pipeline workers and pipe trucks would no longer be traveling north on S.R. 295 with the plant construction buses and materials trucks.

The maximum daily loading to S.R. 295 from Powell to the Elk Basin Field is projected at 97 car/pickup round-trips (67 pipeline + 30 miscellaneous), 5 buses, and 15 20-ton truck round-trips. The number of buses would increase in the third and fourth quarter of 1990 and the first quarter of 1991 to ten. The 30 miscellaneous car/pickup trips would still be present, but the pipeline crew car/pickup traffic would no longer occur.

S.R. 295 is a paved road through Powell to the site of the proposed Elk Basin CO_2 Recycle Plant. From near this point, the road becomes gravel, runs north through the Elk Basin Field, and terminates at S.R. 72 in Montana. The road is only lightly used after it becomes gravel surface. State Highway 295 runs through the town of Powell, through farmlands, ascends Polecat Bench and traverses the plateau to the proposed plant site.

Within the town of Powell and the nearby farming area north to Polecat Bench, impacts to transportation could occur during the early project stages, when both the plant construction and pipeline construction route is north on S.R. 295. Once atop Polecat Bench the terrain is relatively flat and the road is straight. Prudent passing opportunity would be available. Delays in town could occur, but distances are so short that only a few minutes would be lost by local traffic. Traffic, especially local traffic, adjusts its routing to minimize delays; locals would soon use parallel streets in town and cross S.R. 295 at traffic lights.

The maximum impact to average annual daily traffic (Criterion #2) would occur in 1990, a full year of construction (Table 5). Over the year, an average of 6 buses, 15 20-ton trucks, and 30 miscellaneous pickup/car would make the round-trip from Powell to the proposed plant site, for a total of 51 round-trips each day. With an assumed 6 days per week and ignoring specific holidays, 313 work

Table 3-4. Busload Projections for Construction of the Elk Basin Project.

	1989			1990				1991		
Project/Component	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Recycle Plant Construction	0	0	0	0	2	7	9	10	6	2
Field Facilities Construction	1	3	1	1	2	2	1	0	0	0
Total Buses	1	3	1	1	4	9	10	10	6	2

Table 3-5. Workforce Projections for Construction and Operation of the Elk Basin Project.

	1989			1990				1991		
Project/Component	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Recycle Plant										
Construction	0	0	0	0	120	350	450	500	320	110
Operations	0	0	0	0	0	0	0	0	6	6
Field Facilities Construction	40	120	50	50	100	90	50	0	0	0
Trunk Pipeline (a)										
Construction	0	0	0	0	240	320	120	0	0	0
Operations	0	0	0	0	0	2	2	2	2	2
Total Construction (b)	40	120	50	50	460	760	620	500	320	110
Total Operation	0	0	0	0	0	2	2	2	8	8
TOTAL WORKFORCE	40	120	50	50	460	762	622	502	328	118

a = Workforce projection based on two spreads operating simultaneously.
b = Plant, field and trunk pipeline construction workforce.

Table 3-4. Revised Projections for Construction of the Elk River Plant.

Project/Component	1980			1990			2000		
	20	35	45	10	30	50	10	20	30
Navajo Plant Construction	8	8	5	2	2	7	5	15	5	2
Fuels Facilities Construction	1	3	1	1	2	2	1	6	0	2
Total Costs	1	1	3	1	1	2	30	10	0	2

Table 3-5. Projected Costs for Construction and Operation of the Elk Fuels Project.

Project/Component	1980			1990			2000		
	20	30	40	10	30	50	10	20	30
Navajo Plant Construction	5	5	3	8	127	105	400	400	320	170
Operations	0	0	0	8	2	0	4	0	5	8
Fuels Facilities Construction	50	127	55	30	100	80	30	0	0	0
Total Capital (a)	0	0	0	3	300	320	125	5	0	0
Operations Operations	0	0	4	8	6	2	1	2	2	1
Total Construction (b)	55	170	50	50	410	285	550	400	320	170
Total Operations	0	0	0	0	2	1	1	2	8	2
Total Expenditures	55	170	50	50	410	302	551	402	328	172

a = Workforce projections based on two normal operating significantly.
b = Plant, fuel and cross operation construction activity.

days occur, giving a total of 15,963 vehicle round-trips in 1990. Pipeline construction workers, using personal vehicles, would add a small number of trips at the very onset of construction, but within a few weeks the pipeline construction would have advanced southward, and their route to work would not include S.R. 295 north, the route of the buses and plant trucks. For purposes of average annual daily traffic on this road segment, the pipeline worker contribution is not meaningful.

By definition (TRB, 1985), the average annual daily traffic is the amount of traffic passing a point in both directions for a year, divided by the number of days in a year. The 15,963 vehicle round-trips equals an average annual daily traffic of 44.

The ADT of S.R. 295 north of Powell is 590. As discussed above in Section 3.1.1.2, capacity of the roadway at a Level of Service C greatly exceeds this loading. The addition of 44 trips, an increase of 7.5 percent, would not be expected to reduce the level of service on S.R. 295 to below a level C.

As the pipeline spreads move toward a meeting south of Worland, pipeline workers utilize different routes to use that combination that most quickly and easily takes them to the construction point. No road segments would be used for a sufficiently long time to affect the average annual daily traffic in terms of reduction below a Level of Service C.

3.3.3 Criterion #3: Accelerated Roadway Deterioration

The addition of this traffic could accelerate the deterioration and related maintenance costs of S.R. 295 through the town of Powell and adjacent farming areas.

3.3.4 Criterion #4: Vehicle Accident Probability

The vehicle accident probability would rise during the first stages of construction, due to the sudden increase in the number of vehicles. The large outflow of private vehicles from the staging area after the buses unload can create a situation in which accidents are more likely with many vehicles trying to enter traffic in a short time. Location and orientation of the staging area can greatly reduce this risk.

S.R. 295 has a reported ADT of 590 (Table 3-1). The vehicle accident probability is 0.98 accident per million vehicle miles traveled. In 1990, the proposed project would generate an additional 383,000 vehicle miles. Given the adequate level of service and present probability of 0.98 accident per million vehicle miles, the proposed project traffic would not be expected to increase the vehicle accident probability to exceed the state average of 1.35.

3.3.5 Criterion #5: Interruption of Pipelines or Power Lines

Normal flow and maintenance of pipelines and power lines would not be affected.

Construction techniques allow pipelines and pipeline rights-of-way to be crossed. The pipeline trench would not remain open long enough to interfere with maintenance of other lines.

3.4 BEAVER CREEK CO_2 PROJECT

3.4.1 Criterion #1: Traffic Delays

Project actions would not be expected to result in vehicle travel delays of more than ten minutes per hour. As noted in Section 3.1.2.1 above, highways would not be cut by the pipeline trench, but would be dry bored. This would eliminate the bulk of traffic delays associated with construction.

3.4.2 Criterion #2: Annual Traffic Increases

Construction of the 44 miles of 18-inch pipeline would require transportation of 5,808 tons of pipe and material. The pipeline would be constructed in 1992 over a period of 6 months (26 weeks). At a constant rate, 12 loads per week of material would be required. This would average six loads per day, two days per week, and require three trucks. These trucks would be dispersed over the route most of the time; at a maximum all three could utilize the same route simultaneously.

The number of pipeline workers would reach a maximum of 160 in both the second and third quarters of 1992. Assuming 1.8 passengers per vehicle (BLM, 1985), the maximum number of daily trips from Riverton would be 88.

Construction of the Beaver Creek CO_2 Recycle Plant would require approximately 50,000 tons of material. The plant would be constructed over a period of 18 months. Peak 20-ton truck traffic would consist of 15 round-trips per day. This would require use of eight trucks. A maximum of eight trucks could utilize a route at any one time; in fact, at most times of the day, some trucks will be driving to the site, some returning to the yard and some loading or unloading.

The number of plant and field facility workers would reach a maximum of 370 in the third quarter of 1992, requiring 6 buses (Tables 3-6 and 3-7). An additional 30 cars or pickup truck trips per day is estimated for supervisory, engineering or supply trips.

Maximum daily highway loading of S.R. 135 from Riverton to the Beaver Creek Field would be 118 (88 pipeline crew + 30 miscellaneous) pickup/car round-trips, 6 buses, and 21 20-ton trucks. Toward the southern end of the proposed pipeline route, access is supplied by U.S. Highway 287 (Figure 3-7).

As the pipeline progresses southeast, workers residing in or near Lander would use S.R. 135 south less and begin using U.S. 287/S.R. 789 to S.R. 135 north. Local traffic redistributes itself to ease of travel; some vehicles originating in Lander may opt early in the project to use this slightly longer but less congested route (Figure 3-7). Any workers from Jeffrey City or Casper would not use S.R. 135 south. These groups would reduce the numbers of vehicles assumed in the above analyses.

Near the town of Riverton and along S.R. 135 as far as the turn to the Beaver Creek Field, impacts to traffic circulation could occur early in the project when pipeline crews and plant construction crews are all arriving and departing the Beaver Creek Field area at or near the same time. As the pipeline progresses south, the two groups would be on the highway at different times. The road is relatively straight and not heavily used, allowing traffic to usually pass with little delay.

Table 3-6. Busload Projections for Construction of the Beaver Creek Project.

	1991			1992				1993		
Project/Component	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Recycle Plant Construction	0	0	0	3	4	6	2	2	1	0
Field Facilities Construction	1	2	1	1	2	2	2	0	0	0
Total Buses	1	2	1	4	6	8	4	2	1	0

Table 3-7. Workforce Projections for Construction and Operation of the Beaver Creek Project.

	1991			1992				1993		
Project/Component	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Recycle Plant										
Construction	0	0	0	170	210	270	100	80	20	0
Operations	0	0	0	0	0	0	0	6	6	6
Field Facilities										
Construction	40	80	40	20	70	100	80	0	0	0
Trunk Pipeline										
Construction	0	0	0	0	160	160	0	0	0	0
Operations	0	0	0	0	0	0	2	2	2	2
Total Construction (a)	40	80	40	190	440	530	180	80	20	0
Total Operation	0	0	0	0	0	0	2	8	8	8
TOTAL WORKFORCE	40	80	40	190	440	530	182	88	28	8

a = Plant, field and trunk pipeline workforce.

The maximum impact to average annual daily traffic (Criterion #2) would occur in 1992 (Table 3-7). Over the year, an average of 6 buses, 15 20-ton trucks, and 30 miscellaneous pickup/cars would make the round-trip from Riverton to the plant site each day on S.R. 135.

The pipeline construction people and materials would also use S.R. 135, contributing 12 20-ton truck round-trips per week, and 88 pickup/car round-trips, spaced over the 6-month (26 week) construction period. Plant and field construction would contribute a total of 51 vehicle round-trips each day (6 buses + 15 trucks + 30 miscellaneous). With an assumed 6-day work week, and ignoring specific holidays, 313 work days would occur, giving a total of 15,963 vehicle round-trips to service the plant site in 1992. Pipeline construction would contribute a total of 14,040 (12 20-ton trucks per week for 26 weeks = 312; 88 pickup/cars per day for 156 days = 13,728).

Average annual daily traffic (ADT) is the number of vehicles passing a point in both directions for a year, divided by the number of days in a year. The total traffic projected to the Beaver Creek CO_2 Project construction is 30,003 round-trips, or an ADT of 82.

The ADT of S.R. 135 south of Riverton is 380 (Table 3-1). As detailed in Section 3.1.1.2 above, the capacity of a two-lane rural highway operating at a Level of Service C greatly exceeds this loading. The addition of 82 ADT is a 22 percent increase, but S.R. 135 carries little traffic in its baseline. The project construction traffic would not be expected to reduce the level of service on S.R. 135 to below a Level C.

3.4.3 Criterion #3: Accelerated Roadway Deterioration

Heavy vehicles can cause deterioration of roadways. With the proposed project, S.R. 135 would carry a regular load of 20-ton trucks and buses over an 18-month period. The addition of this traffic could accelerate the deterioration and related maintenance costs of S.R. 135.

3.4.4 Criterion #4: Vehicle Accident Probability

The vehicle accident rate probability would rise during the first stages of construction due to the sudden increase in the number of vehicles. The large outflow of private vehicles from the staging area after the buses unload can create a situation in which accidents are more likely with many vehicles trying to enter traffic in a short time. Location and orientation of the staging area can greatly reduce this risk.

Entry to S.R. 135 south from Riverton requires a left turn. The highway (S.R. 789) contains two lanes in each direction at this juncture, with a long left-turn lane already in place. This orientation would facilitate movement of traffic from Riverton onto S.R. 135.

S.R. 135 has a reported ADT of 380 (Table 3-1), one of the lowest loading of all of the roadways considered. The vehicle accident probability is 0.7 accident per million vehicle miles, lowest of all highways considered. With an approximate 20-mile trip from Riverton to the Beaver Creek Field and an average 40-mile trip to the pipeline construction site, the project would generate 1.76 million vehicle miles. Given the present level of service and present vehicle accident probability of 0.7 accident per million vehicle miles traveled, the

projected project traffic would not be expected to increase the vehicle accident probability above the state average of 1.35.

3.4.5 Criterion #5: Interruption of Pipelines or Power Lines

Normal flow and maintenance of pipelines and power lines would not be affected. Construction techniques allow pipelines and pipeline rights-of-way to be crossed. The pipeline trench would not remain open long enough to interfere with maintenance of other lines.

3.5 LITTLE BUFFALO BASIN CO_2 PROJECT

3.5.1 Criterion #1: Traffic Delays

Project actions would not be expected to result in vehicle travel delays of more than ten minutes per hour. As noted in Section 3.1.2.1 above, highways would not be cut by the pipeline trench, but would be dry bored. This would eliminate the bulk of traffic delays associated with construction.

3.5.2 Criterion #2: Annual Traffic Increases

Construction of the 35 miles of 16-inch pipeline would require transportation of 4,620 tons of pipe and material. The pipeline would be constructed between in 1993 over a period of 6 months (26 weeks). At a constant rate, nine loads of pipe per week would be required. With delivery assumed at two days per week, a maximum of five loads, equaling five round-trips per day by the 20-ton trucks. This would require the use of three trucks. As discussed above (Section 3.1), most of the time, trucks are split among loading, delivery, unloading and return to yard.

The number of pipeline workers would reach a maximum of 100 in both the second and third quarters of 1993. Assuming 1.8 passengers per vehicle (BLM, 1985), the maximum number of daily trips would be 56 from Worland, the community of origin.

Construction of the Little Buffalo Basin CO_2 Recycle Plant would require approximately 50,000 tons of material. The plant would be constructed over a period of 18 months. Peak 20-ton truck traffic would consist of 15 round-trips per day. This would require use of eight trucks. A maximum of eight trucks could utilize a route at any one time; in fact, at most times of the day, some trucks will be driving to the site, some returning to the yard and some loading or unloading.

The number of plant and field facility workers would reach a maximum of 370 in the third quarter of 1993, requiring 6 buses (Table 3-8). An additional 30 cars or pickup truck trips per day is estimated for supervisory, engineering or supply trips. Maximum 20-ton truck traffic would likely occur at the onset of plant construction, in the first quarter of 1993. The spur pipeline construction begins in the following quarter (Table 3-9).

Table 3-8. Busload Projections for Construction of the Little Buffalo Basin Project.

Project/Component	1992			1993				1994		
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Recycle Plant Construction	0	0	0	4	4	5	2	2	1	0
Field Facilities Construction	1	2	1	1	3	2	0	0	0	0
Total Buses	1	2	1	5	7	7	2	2	1	0

Table 3-9. Workforce Projections for Construction and Operation of the Little Buffalo Basin Project.

Project/Component	1992			1993				1994		
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Recycle Plant										
Construction	0	0	0	170	210	270	100	80	20	0
Operations	0	0	0	0	0	0	0	6	6	6
Field Facilities Construction	30	80	50	40	120	100	0	0	0	0
Spur Pipeline										
Construction	0	0	0	0	100	100	0	0	0	0
Operations	0	0	0	0	0	0	0	0	0	0
Total Construction (a)	30	80	50	210	430	470	100	80	20	0
Total Operation	0	0	0	0	0	0	0	6	6	6
TOTAL WORKFORCE	30	80	50	210	430	470	100	86	26	6

a = Plant, field and spur pipeline workforce.

The maximum highway loading for the route from Worland to the Little Buffalo Basin Field (U.S. 20--S.R.431--S.R.120) is projected at 86 pickup/car trips, 6 buses and 20 trucks. As the pipeline is built, those workers will need to travel progressively fewer miles, thereby needing less travel time, which would separate their traffic more and more from the plant construction traffic.

U.S. 20 is a major highway running south of Worland toward Thermopolis. S.R. 431 branches west from U.S. 20, generally following the edge of the Gooseberry Creek valley to terminate at S.R. 120. Little Buffalo Basin has its own entry road, west off S.R. 120, 15 miles north of the juncture with S.R. 431. S.R. 120 is the main route from Cody to Thermopolis; U.S. 20 is the main route from Thermopolis to Worland to Greybull. S.R. 431 is largely used by local traffic, serving the ranches along Gooseberry Creek (Figure 3-9).

Some impacts to traffic could occur early in the project when the additions to traffic are greatest. Worland's street system has wide major arteries with traffic lights. Traffic would be turning right from U.S. 20 to S.R. 431, and from S.R. 431 to S.R. 120, all non-opposing moves. Left turns would have to be made from S.R. 120 to the Little Buffalo Basin Road across traffic. Relatively early in the project the pipeline construction will have moved east of U.S. 120, eliminating this turn across traffic by the pickups/cars of the pipeline crews.

These analyses assume all of the pipeline workers will reside in Worland. Any residents of Thermopolis working on the spur pipeline would use S.R. 120 during at least the early stages of the project. Any such use would decrease the potential for traffic impacts on S.R. 431 (Figure 3-9).

Left turns across traffic would occur throughout the project at the end of the day from S.R. 120 to S.R. 431, and from S.R. 431 to U.S. 20. Installation of turn lanes and warning signals may be necessary. The maximum impact to average annual traffic (Criterion #2) would occur in 1993 over a full year of construction. Over the year, an average of 6 buses, 15 20-ton trucks and 30 miscellaneous pickup/cars would make the round-trip from Worland to the proposed plant site for a total of 51 round-trips each day. With an assumed 6-day work week and ignoring specific holidays, 313 work days occur, resulting in 15,963 vehicle round-trips in 1993 to the proposed plant site.

Pipeline construction workers using personal vehicles would contribute 56 vehicle round-trips per day over a 6-month period, resulting in a total of 8,736 vehicle round-trips in 1993. Pipeline construction would also require 234 round-trips by 20-ton trucks. The spur pipeline construction would therefore generate a total of 8,970 vehicle round-trips.

The proposed Little Buffalo Basin CO_2 Project construction of plant and spur pipeline would result in 24,933 vehicle round-trips from Worland.

The average annual daily traffic (ADT) is the amount of traffic passing a point in both directions for a year, divided by the number of days in a year. The 24,933 vehicle round-trips equals 68 ADT.

The reported ADT of S.R. 431 is 295 (Table 3-1). As discussed in Section 3.1.1.2, capacity of a two-lane rural highway operating at a Level of Service C greatly exceeds this loading. The addition of 68 ADT, while a 23 percent increase, would not be expected to reduce the level of service on S.R. 431 to below a Level C.

3.5.3 Criterion #3: Accelerated Roadway Deterioration

Projected traffic attributable to the construction of the Little Buffalo Basin CO_2 Project would increase traffic on S.R. 431 over a period of 18 months. Passage of heavy vehicles, including 20-ton trucks and buses, can affect the roadway. S.R. 431 is used generally by local traffic, including heavy seasonal use by beet trucks.

The addition of this traffic could accelerate the deterioration and related maintenance costs of S.R. 431, and the short segments of U.S. 20 and S.R. 120.

3.5.4 Criterion #4: Vehicle Accident Probability

The vehicle accident probability would rise during the first stages of construction due to the sudden increase in the number of vehicles. The large outflow of private vehicles from the staging area after the buses unload can create a situation in which accidents are more likely with many vehicles trying to enter traffic in a short time. Location and orientation of the staging area can greatly reduce this risk.

State Route 431 has a reported ADT of 295 (Table 3-1). The vehicle accident probability is 1.2 accidents per million vehicle miles traveled. With plant construction vehicles contributing a 60-mile round-trip each day on S.R. 431 (957,780 miles) and pipeline construction vehicles averaging 30 miles round-trip each day (269,100), construction of the project would add 1.22 million vehicle miles to the traffic on S.R. 431 in 1993.

Projections of effects to vehicle accident probability are at best imprecise. The baseline accident rate on S.R. 431 is 1.2 accidents per million vehicle miles traveled (Table 3-1). The state average for two-lane primary highways, the standard used in these analyses, is 1.35 accidents per million vehicle miles. The baseline on S.R. 431 is sufficiently near the state average that traffic attributable to the proposed project could increase the vehicle probability to near or above the state average.

3.5.5. Criterion #5: Interruption of Pipelines or Power Lines

Normal flow and maintenance of pipelines and power lines would not be affected. Construction techniques allow pipelines and pipeline rights-of-way to be crossed. The pipeline trench would not remain open long enough to interfere with maintenance of other lines.

3.6 SALT CREEK CO_2 PROJECT

3.6.1 Criterion #1: Traffic Delays

Traffic delays of greater than ten minutes per hour would not be expected with construction of the proposed project. The spur pipeline is relatively short (nine miles) and would pass under Interstate 25.

3.6.2 Criterion #2: Annual Traffic Increases

Construction of the nine miles of 16-inch pipeline would require transportation of 1,188 tons of pipe and material. The pipeline would be constructed in 1994 over a period of 2 months (8 weeks). At a constant rate, eight loads of pipe and materials per week would be required. These would probably be delivered two days per week by two trucks, making two round-trips.

The number of pipeline workers would reach a maximum of 80 in third quarter of 1994. Assuming 1.8 passengers per vehicle (BLM, 1985), the maximum number of daily trips would be 44 from Casper, the community of origin. Travel of any workers drawn from Midwest and Edgerton would be negligible. This analysis assumes maximum travel, which assigns all personnel to Casper.

Construction of the Salt Creek CO_2 Recycle Plant would require approximately 50,000 tons of material. The plant would be constructed over a period of 15 months. Peak 20-ton truck traffic would consist of 15 round-trips per day. This would require use of eight trucks. A maximum of eight trucks could utilize a route at any one time; in fact, at most times of the day some trucks will be driving to the site, some returning to the yard and some loading or unloading.

The number of plant and field facility workers would reach a maximum of 490 in the second quarter of 1994, requiring 10 buses (Tables 3-10 and 3-11). An additional 30 cars or pickup truck trips per day is estimated for supervisory, engineering or supply trips.

The maximum highway loading for Interstate 25 from Casper to the Salt Creek Field is 74 pickup/car trips, 27 trucks and 10 buses. I-25 is an interstate highway, with a full interchange to S.R. 387, a two-lane paved road running the last six miles to the Salt Creek Field. The area of proposed pipeline west of I-25 parallels Natrona County Road 115, a dirt road. At the present time, this road is easily passable and well maintained.

No impacts to transportation would be expected on the Salt Creek CO_2 Project. The capacity of the Casper road system and of I-25 can easily handle the increased project-related traffic. The small communities of Midwest and Edgerton will experience additional traffic on the short (six-mile) segment between the Salt Creek Field and I-25.

The reported ADT for I-25 is 2,476 (Table 3-1). Construction of the proposed Salt Creek CO_2 Recycle Plant would generate the most traffic in 1994. Fifteen 20-ton trucks, an average of 7 buses, and 30 miscellaneous pickup/cars would make the round-trip from Casper each day, six days per week. Ignoring specific holidays, 313 working days would occur, yielding 16,276 round-trips to service plant construction.

The spur pipeline would be built over an 8-week period (48 working days). An average of 70 workers would use 39 pickup/cars, adding 1,872 trips. The Salt Creek CO_2 Project construction would add 18,148 vehicle round-trips from Casper in 1994. This translates to an ADT of 50. With a reported ADT of 2,476 (Table 3-1), the proposed project's traffic increase on I-25 would be 2 percent. This increase would not reduce the level of service on I-25 to below a Level C.

Table 3-10. Busload Projections for Construction of the Salt Creek Project.

Project/Component	1993		1994				1995				1996				1997			
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Recycle Plant Construction	0	2	4	6	5	2	0	0	0	0	0	0	0	0	0	0	0	0
Field Facilities Construction	0	3	3	4	3	1	2	6	5	2	2	7	8	2	2	4	6	3
Total Buses	0	5	7	10	8	3	2	6	5	2	2	7	8	2	2	4	6	3

Table 3-11. Workforce Projections for Construction and Operation of the Salt Creek Project.

Project/Component	1993		1994				1995				1996				1997			
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Recycle Plant																		
Construction	0	100	200	300	250	110	0	0	0	0	0	0	0	0	0	0	0	0
Operations	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Field Facilities Construction	0	150	150	190	160	60	80	300	250	70	90	340	390	60	80	200	280	150
Spur Pipeline																		
Construction	0	0	0	60	80	0	0	0	0	0	0	0	0	0	0	0	0	0
Operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Construction (a)	0	250	350	550	490	170	80	300	250	70	90	340	390	60	80	200	280	150
Total Operation	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6
TOTAL WORKFORCE	0	250	350	550	496	176	86	306	256	76	96	346	396	66	86	206	286	156

a = Plant, field and spur pipeline workforce.

3.6.3 Criterion #3: Accelerated Roadway Deterioration

Heavy vehicles accelerate the deterioration of roadways. The incremental 2 percent increase in traffic attributable to the Salt Creek CO_2 Project construction would not be significant.

3.6.4 Criterion #4: Vehicle Accident Probability

The reported vehicle accident probability on I-25 is 0.76 accident per million vehicle miles. The incremental increase in traffic attributable to the proposed Salt Creek CO_2 Project would not significantly affect that probability.

3.6.5 Criterion #5: Interruption of Pipelines or Power Lines

Normal flow and maintenance of pipelines and power lines would not be affected. Construction techniques allow pipelines and pipeline rights-of-way to be crossed. The pipeline trench would not remain open long enough to interfere with maintenance of other lines.

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